lowest, 32° below zero, at McKinney on the 31st. The average precipitation was 0.13, or 0.46 below normal; the greatest monthly amount, 0.65, occurred at Napoleon, and the least, trace, at a number of stations.—*B. H. Bronson.*

Ohio.—The mean temperature was 32.4°, or 5.0° above normal; the highest was 71°, at Canton on the 12th, and the lowest, 18° below zero, at Levering on the 2d. The average precipitation was 5.25, or 2.00 above normal; the greatest monthly amount, 11.69, occurred at Cherryfork, and the least, 2.53, at Dupont. The month was the wettest January for sixteen years.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 40.0°; the highest was 77°, at Anadarko on the 11th, and the lowest, 7°, at Clifton. The average precipitation was 3.09; the greatest monthly amount, 5.86, occurred at Tahlequah, and the least, 0.80, at Putnam.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 34.3°, or 0.4° below normal; the highest was 64°, at Ashland and Langlois, and the lowest, 21° below zero, at Burns. The average precipitation was 3.87, or 2.56 below normal; the greatest monthly amount, 14.26, occurred at Bay City, and the least, 0.27, at Silverlake.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 30.7°, or 3.4° above normal; the highest was 67°, at Greensboro and Pittsburg on the 12th, and the lowest, 16° below zero, at Lawrenceville, on the 2d. The average precipitation was 4.25, or 0.73 above normal; the greatest monthly amount, 7.57, occurred at Johnstown, and the least, 1.32, at Reedsville.—*T. F. Townsend.*

South Carolina.—The mean temperature was 49.2°, or 3.2° above normal; the highest was 82°, at Trial on the 10th, and the lowest, 8°, at Central on the 2d. The average precipitation was 1.80, or 2.60 below normal; the greatest monthly amount, 4.06, occurred at Central, and the least, 0.19, at Charleston and Yemassee.—*J. W. Bauer.*

South Dakota.—The mean temperature was 22.8°, or about 12.0° above normal; the highest was 63°, at Harney on the 2d, and the lowest, 22° below zero, at Eureka on the 29th. The average precipitation was 0.24, or 0.28 below normal; the greatest monthly amount, 1.50, occurred at Oelrichs, while none fell at several stations.—*S. W. Glenn.*

Tennessee.—The mean temperature was 43.8°, or about 5.5° above normal; the highest was 75°, at Chattanooga and St. Joseph on the 11th and at Newport on the 12th, and the lowest, 3°, at Silverlake on the 2d. The average precipitation was 8.81; in the eastern portion it was 2.50 above normal; in the middle, 4.25; and in the western, 6.75; the greatest monthly amount, 14.86, occurred at Trenton, and the least, 4.02, at Bristol.—*H. C. Bate.*

Texas.—The mean temperature for the State was 2.4° above the normal. There was a general excess in all sections, except over the panhandle, where it was about the normal, and over west Texas, where there was a slight deficiency, with the greatest, 2.3°, in the vicinity of El Paso. The excess was slight over north Texas and in localities over the east coast district, while it ranged from 2.2° to 6.4° over central, southwest, and east Texas, and the western portion of the coast district, with the greatest in the vicinity of Palestine. The highest was 91°, at Fort Ringgold on the 24th, and the lowest, 5°, at Tulia on the 20th. The average precipitation for the State was 0.51 below the normal. There was a slight excess along the immediate east coast and over the panhandle and north Texas, with the greatest, 2.84, in the vicinity of Longview, while there was a general deficiency over the other portions of the State, but the deficit was comparatively light, not amounting to as much as 1.00, except over the eastern portion of southwest Texas and the central and western portions of the coast district, where it ranged from 1.00 to 3.03, with the greatest in the vicinity of Brazoria. The greatest monthly amount, 9.42, occurred at Longview, while none fell at several stations.—*I. M. Cline.*

Utah.—The mean temperature was 16.9°; the highest was 69°, at Thistle on the 1st, and the lowest, 34° below zero, at Fort Duchesne on the 25th. The average precipitation was 1.07; the greatest monthly amount, 2.65, occurred at Pahreah, and the least, 0.15, at Fillmore.—*J. H. Smith.*

Virginia.—The mean temperature was 39.9°, or about 3° or 4° above normal; the highest was 79°, at Cape Henry on the 22d, and the lowest, 2°, at Burkes Garden and Monterey on the 2d. The average precipitation was 2.62, or 1.76 below normal; the greatest monthly amount, 6.40, occurred at Bigstone Gap, and the least, 1.05, at Richmond.—*E. A. Evans.*

Washington.—The mean temperature was 32.6°, or nearly normal; the highest was 61°, at Clearwater on the 1st, and the lowest, 9° below zero, at Fort Spokane on the 24th. The average precipitation was 3.16, or 2.00 below normal; the greatest monthly amount, 15.62, occurred at Clearwater, and the least, trace, at Bridgeport.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 37.1°, or about 3.0° above normal; the highest was 75°, at Uppertract on the 13th, and the lowest, 5° below zero, at Powellton on the 2d. The average precipitation was 5.10, or about 1.50 above normal; the greatest monthly amount, 8.04, occurred at Point Pleasant, and the least, 2.24, at Green Sulphur Springs.—*H. L. Ball.*

Wisconsin.—The mean temperature was 21.3°, or about 5.0° above normal; the highest was 55°, at North Crandon on the 18th, and the lowest, 22° below zero, at the same station on the 31st. The average precipitation was 1.22, or slightly below normal; the greatest monthly amount, 4.00, occurred at Port Washington, and the least, 0.03, at Osceola.—*W. M. Wilson.*

Wyoming.—The mean temperature was 17.7°, or 5.1° below normal: the highest was 60°, at Fort Laramie on the 3d, and the lowest, 40° below zero, at Greenriver on the 26th. The average precipitation was 0.55, or 0.11 below normal; the greatest monthly amount, 1.55, occurred at Greenriver, and the least, trace, at Otto.—*W. S. Palmer.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

After a fall during the earlier part of January, the Ohio and its chief tributaries, the Cumberland and Tennessee, rose rapidly until about the 25th. The consequent rise in the lower Mississippi was sharp and continuous to the end of the month. On the last day the stage at Cairo was 4.4 feet above the danger line; the river at Memphis had reached the danger line and was less than a foot below at Vicksburg. The western tributaries are all at low stages and, as the Ohio flood is fast running out, no serious conditions will arise from the precipitation which has already fallen. The lower river, however, is well filled, and heavy rainfall in the early part of February would cause a flood.

The highest and lowest water, mean stage, and monthly range at 117 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on the accompanying chart. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River. (Reported by A. F. Sims, Albany, N. Y.)—On the 1st of January, notwithstanding an air temperature of 4° below zero, a few open spots were still to be seen at places here and there in the tidewater portion of the Hudson, due to the water being kept in a state of agitation. On the 4th the snow on the watershed area of the Hudson averaged 8 inches. The ice formation in the principal ice-harvesting districts is very lumpy, which necessitates much planing prior to its being housed.

On the 18th the snow on the watershed of the Hudson ranged from 9 inches at Saranac to a trace at Poughkeepsie, and the ice in the Hudson River ranged from 10 inches at Waterford to floating ice at Newburg. The ice was massed in huge blocks, rendering ice harvesting impracticable, and even preventing persons from crossing. In front of many houses along the river there is a jumbled mass of broken ice piled many feet and in the ice channels extending down to the bottom. The best ice will be harvested from behind the dikes and in the creeks.

The weather and temperature conditions of the 23d rendered the ice mushy and so soft that a pike pole could be sunk to the depth of several inches. On the 24th the river from the Poughkeepsie bridge to New York was entirely free of ice; all ferryboats below Poughkeepsie were running. At Albany the ice was piled in jagged masses. At Vanwies Point a smooth unbroken surface of clear ice, extending from shore to shore, began and remained unbroken to a point a short distance above Poughkeepsie bridge. From Fishkill to New York there was nothing to indicate that the river had been frozen, not even a cake of ice was seen on the river banks, except in places behind the dikes.

The end of the month finds the watershed of the Hudson with a good covering of snow, and the river with a good quality of ice, except at Albany, where no ice can be harvested this season on account of the gorge formation.

Susquehanna River. (Reported by E. R. Demain, Harrisburg, Pa.)—The waters of the Susquehanna and its tributaries were higher than is

usual during the month of January and decidedly above the stages prevailing in January, 1897. In the latter month twelve stations gave an average gauge reading of 2.0 feet and sixteen stations an average precipitation of 1.74 inch. For January, 1898, the average gauge reading of eighteen stations was 3.8 feet and the average rainfall 3.36 inches. The cold spell, beginning the last day of December and continuing several days into January, caused a general closing of the North and West branches, which remained icebound from thirteen to fifteen days.

The only flood of any consequence during the month occurred at Wilkesbarre. The ice broke up suddenly on the morning of the 15th and moved out before daylight, and for a short time the river was free of ice; about noon slush ice began to run. The river rose rapidly during the afternoon, reaching a height of 19 feet on the gauge, 5 feet above the danger line. This sudden rise was due to an ice gorge at Nanticoke, a town 8 miles below Wilkesbarre. This portion of the river is narrow and the flow rapid, the mountains coming down abruptly on either side to the edge of the stream. The floods caused stoppage of the street cars and the suspension of all traffic between Wilkesbarre and Kingston, on the opposite side of the river, for two days. Westmoreland, a place of 1,000 population, was also cut off. The gorge at Nanticoke broke up on the 16th and the river fell rapidly. The conditions at Wilkesbarre are such that high waters are dreaded. A stage of 25 feet floods the lower end of the city. At a stage of 20 feet the openings to many of the mines are banked up and frequently the men are called out.

The following data relative to the closing and opening of the Susquehanna at Harrisburg since 1870 was kindly furnished by Mr. Wm. A. Kelker, of Harrisburg:

The Susquehanna River at Harrisburg.

Icebound.	Opened.	Icebound.	Opened.
Dec. 29, 1870	Jan. 15, 1871	Dec. 8, 1882	Feb. 5, 1883
Feb. 12, 1871	Feb. 17, 1871	Dec. 24, 1883	Feb. 7, 1884
Dec. 20, 1871	Mar. 23, 1872	Jan. 29, 1885	Apr. 1, 1885
Dec. 22, 1872	Jan. 18, 1873	Jan. 15, 1886	Feb. 13, 1886
Jan. 29, 1873	Feb. 7, 1873	Mar. 3, 1886	Mar. 5, 1886
Feb. 24, 1873	Mar. 11, 1873	Jan. 5, 1887	Jan. 25, 1887
Jan. 10, 1875	Feb. 27, 1875	Jan. 20, 1888	Feb. 22, 1888
Dec. 10, 1876	Feb. 3, 1877	Dec. 25, 1892	Feb. 10, 1893
Jan. 8, 1878	Jan. 12, 1878	Dec. 29, 1894	Jan. 10, 1895
Dec. 26, 1878	Mar. 8, 1879	Jan. 9, 1896	Jan. 25, 1896
Dec. 10, 1880	Feb. 11, 1881	Jan. 27, 1897	Feb. 7, 1897

Rivers of the South Atlantic States. (Reported by E. A. Evans, Richmond, Va.; C. F. von Herrman, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga.; and J. B. Marbury, Atlanta, Ga.)—Notwithstanding a marked deficiency in precipitation over the major portion of the James River basin, the water remained at about its normal height. As compared with January, 1897, it showed a slight increase on practically the same amount of precipitation. The month opened with stages a little above zero. A slight fall occurred on the 4th to —0.1 foot, which was the lowest reading for the month, and it remained stationary at this point until the 12th, on which date it began to rise slowly. Intermittent rains during the next eleven days sufficed to keep the stream above zero of the gauge, and during this period a moderate rise of about 2 feet occurred. Thereafter, until the close of the month, it remained above zero. Navigation was unimpeded from this station to the mouth of the river. Above the falls thin ice formed early in the month in shallow and sheltered places. The volume of water was amply sufficient for milling purposes on the James and its tributaries, and was quite free from sediment and discoloration.

No noteworthy events in connection with the condition of the rivers in North Carolina occurred during January, 1898. The number of days with precipitation was about the average, but the amounts were very small, and on account of the unusually mild winter had less influence than if the soil had been frozen. No accumulation of snow has taken place even in the mountains, and ice formed in the upper streams to considerable thickness only on the first few days of the month in the extreme west.

There were two periods during the month when the streams of South Carolina were navigable, viz, from the 1st to the 6th and from the 24th to the 31st. Early in January river men and lumbermen were hopeful of good steamboat water the entire month, but during the first two decades scarcely sufficient rainfall occurred to maintain navigable stages, and all streams fell rapidly, thereby causing a tie up of most steamers. The general and moderate rainfall on the 24th and 25th swelled the streams to fair proportions, and navigation was fully resumed again by the 26th. The Waccamaw, from Winyah Bay to Conway, was the only stream in the State which was navigable during the entire month. This condition is attributable to the thorough "snagging" the stream has received within the past two years, thus admitting steamers of light draft to ply its waters at very low stages. Between the 6th and 23d the streams on the west side of the Appalachian Range all flooded, while on the eastern side they were at very low stages. The lumber interests have suffered to a great extent on account of low water. There is very much timber cut in the swamps and ready to be floated. In January, 1897, fully one-half of the timber cut up to that time was floated and boomed successfully, while during the past month less than 10 per cent of the season's output has been floated.

There was a marked deficiency of rainfall throughout the Savannah Valley during the month but, notwithstanding this shortage, the river averaged higher than for the past four months, and a fairly good boating stage was maintained all the time. The heavy rains which were general over the upper basin on the 25th caused the water to rise to a height of 16.7 feet at Augusta a few days later, which was the highest stage reached since August 22, but the volume of water thus obtained was soon carried away, and the end of the month found the river a little over 8 feet, which, however, is ample for river traffic. As the exigencies of improved trade called for another steamer, the *Ethel*, which had been withdrawn during the previous month, was again pressed into service, and, together with the *Cook*, made regular trips. There was a marked improvement noted in the volume of business transacted.

During the early part of the month but little rain fell and low water continued in the streams of western Georgia throughout the month. Heavy rain fell in the watershed of the Coosa and Oostanaula on the 25th, causing a marked rise in the river at Resaca on the 26th, and at Rome on the day after. The river at Rome rose 7 feet between the morning observation of the 26th and that of the 27th, when 14.5 feet, the highest point for the month, was reached. The highest point reached at Resaca was 17.1 feet on the morning of the 26th, a rise of 8.3 feet in twenty-four hours. Water too low for navigation continues at nearly all points.

Mobile River and branches. (Reported by F. P. Chaffee, Montgomery, Ala., and W. M. Dudley, Mobile, Ala.)—There was a gradual decline in the Alabama River and tributaries during the first decade, the rainfall during that period being too light to check the fall in the rivers. Well distributed rains during the second decade gave gradual rises to the 23d, and heavy rains near the headwaters on the 24th and 25th caused rapid rises in the Coosa on the 26th, reaching nearly the danger line at Gadsden on the 28th, after which there was a gradual fall in rivers. Navigable stages prevailed in the Alabama and Coosa during the entire month, steamers making regular trips on the Alabama with good freights, and during the last five days of the month considerable timber was rafted on the rivers of this system.

No appreciable rainfall occurred on the Tombigbee watershed until the 6th, when a moderately heavy fall was reported. This made no material change in river stages, but the rain which fell on the 11th caused material rises in the Tombigbee and Warrior. On the 13th a light but general rain fell, causing rises in all the rivers. The rain on the 15th caused continued and marked rises to the 19th. Rain on the morning of the 20th caused anticipation of flood stages, and a warning was sent to the river observers at Tuscaloosa and Demopolis, stating that the river would probably reach danger line by the morning of the 21st. Slight falls occurred on the upper Tombigbee and Warrior rivers on the 22d, but the rain which fell on the 24th and the heavy rain on the morning of the 25th caused general rises, and a warning was again sent to Tuscaloosa and Demopolis. The upper Tombigbee and Warrior rivers began falling on the morning of the 27th, but the rise continued on the lower Tombigbee from Demopolis down. The river stages throughout the month have been favorable to navigation on the Mobile, Tombigbee, and Warrior rivers. While the stages continued low during the first ten days of the month, there has been a general and marked rise in all river stages from that time, giving quite high stages in the Tombigbee and Warrior rivers to the close of the month.

Ohio River and minor branches. (Reported by F. Ridgway, Pittsburg, Pa.; H. L. Ball, Parkersburg, W. Va.; S. S. Bassler, Cincinnati, Ohio; S. P. Gresham, Louisville, Ky.; and P. H. Smyth, Cairo, Ill.)—Considering the season of the year, the month has been one of exceptional activity in navigation. During the first few days only a fair packet stage obtained, but this was quickly augmented to a barge stage, and on the 10th to coal-boat water, which was maintained most of the remainder of the month. To add to the facility of navigation, only the opening and closing days of the month were attended by a light flow of ice, while the high water period was entirely free from it. As a consequence, the coal, iron, and other products loaded into boats at this point were promptly shipped to lower river ports. A natural result of the continued high water, although other conditions were favorable, was to practically close operations on river construction work during the latter two-thirds of the month. While the water reached fairly high stages on several occasions, the danger line was not exceeded in the vicinity of Pittsburg, and practically no damage was sustained by manufacturing and other interests here. The low temperatures prevailing at the end of the month caused a rapid drop in the stages on all the rivers in this vicinity, accompanied by a heavy flow of ice, which promises to quickly close the streams should it continue for a few days longer.

During the first six days of the month the river at Parkersburg fell slowly, reaching a stage of 8 feet. This was the lowest water of the month. Cold weather prevailed until the 6th and most of the smaller rivers of West Virginia were closed by ice. At Parkersburg ice began running on the 2d, and by the morning of the 3d towboats and small

packets were compelled to tie up, but were, however, released on the next day. The Little Kanawha was frozen over on the morning of the 5th, but the ice was thin and easily broken. Floating ice continued until the 8th, but the river was practically free after the 7th.

After the low water of the early part of the month all the rivers were filled by the general and moderately heavy rains which were of frequent occurrence after the 10th. At Parkersburg the crest of the first high water passed on the 16th with a stage of 30.2 feet. From that date until the 22d the river fell slowly. Moderately heavy rains on the 22d brought the second rise of the month and a stage of 31 feet was reached on the 26th, after which the river fell rapidly to a stage of 15.5 feet on the 31st. Excepting the first few days when floating ice impeded navigation, the river conditions during the month were unusually favorable for this period of the year.

The latter part of January, 1898, goes on record as a period of notably high water in the Ohio River at Cincinnati. The major portion of the several successive rises was chiefly due to the tremendous outpour of the streams that empty into the Ohio within a few miles of the gauge at Cincinnati. Previous January stages exceeding 50 feet on the Cincinnati gauge have occurred in 1862, 1870, 1876, and 1877.

In view of the continued rainy weather and the possibility of the rise in the Ohio becoming dangerous, river interests and business men in the bottoms, taught by experience, were, on the 14th, when the river had reached 38 feet, beginning to prepare for prompt action in case of emergency. On Sunday, the 16th, the river continued steadily rising throughout its length. A warning was telegraphed to Point Pleasant that it would pass the danger line (36 feet) at that point, and warnings were issued that the stage would pass the danger line (45 feet) at Cincinnati Sunday night. The danger line was passed at Point Pleasant on the 17th. At Cincinnati, however, the rise only reached 44.6 feet by midnight of the 17th, after which it had a falling tendency, the local freshets having run out. Another southwestern storm caused steady and heavy rains on the 19th over the territory drained by the local streams, which resulted in another sudden and somewhat alarming rise at this point. The first rush of water from the local tributaries caused a rise in the Ohio of 6 inches per hour. This was the more remarkable because of the already high stage and the fact that the bottom lands along the mouths of the tributaries were already submerged by backwater. The danger line was passed at midnight of the 19th. This rise was a purely local one, attributable mainly to the Little Miami River, above the mouth of which tributary the Ohio was falling. The local river forecast was issued that the stage would not exceed 50 feet; the highest gauge reading was 48.4 feet. There was, so far, very little interruption of business in the bottoms. Portions of some of the railroads were submerged, but there was no delay in train service.

The distinctive feature of this high water at Cincinnati is that it was essentially a local affair and that the Little Miami River was the chief contributor. But for the concentration of several successive heavy rains in this vicinity, piling up a tremendous mass of water in front of Cincinnati, the storms of the month would hardly have swollen the river at this point much, if any, above the danger line. There was some falling off in the general business, due to merchants apprehending higher water and to the bad condition of country roads. With the steady recession of the river, a prime factor in the trade of Cincinnati, business is again expanding and the improvement was emphasized by the more seasonable weather during the closing days of the month. Although reaching the unusual stage of 52.2 feet on the gauge, submerging the valleys and lowlands in the vicinity, lapping, as it were, the very doorsteps of the city, and causing much inconvenience and incidental expense in the way of removing goods, and a temporary shutdown of work, the high water of January did not interfere with the regular operations of the railroads or river interests.

The river at Louisville was lowest on the 3d, with 6.8 feet in the canal, which was a good boating stage. It rose steadily from the 7th to the 26th, reaching the highest stage for the month, 29.8 feet, on the latter date. The amount of rainfall for the month was greatly in excess of the normal, 9.04 inches being recorded at this station. The rainfall on the 19th and 20th and again on the 23d was especially heavy, so that the moderate flood stage the river reached at this point was generally expected. The danger line, 24 feet, was passed during the evening of the 20th. Gales on the 20th, 22d, 23d, and 25th, in conjunction with the high water, caused considerable damage to shipping in this vicinity. The wind reached a velocity of 43 miles on the 20th, 52 miles on the 22d, and 53 miles of the 25th. On the afternoon of the 25th the river was rougher than was ever known, and nearly all navigation was temporarily suspended.

The fall which was in progress at the close of December continued at Evansville until the 5th, and at Paducah and Cairo until the 8th. A very slight rise commenced at Evansville by the morning of the 6th, reached Paducah by the morning of the 9th, and started the river up at Cairo by the morning of the 10th. Before this water had drained off, a second and more pronounced rise, caused by heavy rains in the Ohio watershed, started in on the 10th, and this, together with subsequent rises in the Ohio, and occasional rises out of the Cumberland and Tennessee, kept the lower Ohio at a rising stage during the remainder of the month. At Evansville the river rose steadily from the 5th to the 28th, reached the danger line at 7 p. m. on the 15th, and attained its maximum stage, 43.1 feet, on the morning of the 28th; it then commenced to fall and continued falling to the close of the month. On the morning of the 17th, at a stage of 33.4 feet, low bottom lands in the vicinity of Evansville were reported invaded by water, causing some families to move to higher ground. On the 24th, at a stage of 41.7 feet, many families living on bottom lands were driven from their homes and sought shelter in the city. Aside from the inconvenience caused these people no material damage to property resulted from the high water at Evansville. The Louisville Packet Company was obliged to tie up its steamers on the 27th on account of high water and difficulty in making landings, but resumed running on the 31st.

At Paducah, the rise starting in on the 9th continued until the morning of the 30th, when the maximum stage, 43.8 feet, was attained. The river reached the danger line on the morning of the 23d. No material damage nor inconvenience was caused by the high water at this point. All the low bottom lands in the vicinity of Paducah, both on the Ohio and Tennessee rivers, were submerged to a depth of 5 to 7 feet, but so far as at present ascertained no damage to property resulted.

At Cairo the danger line was reached on the 23d, and the maximum stage, 44.4 feet, on the morning of the 31st. The river came to a stand on the latter date, with conditions favorable for an early and rapid fall. The sewer outlets of the city were closed on or about the 17th, since which time the lowest places about the city have been gradually filling with waste and rain water. There is no likelihood, however, of the water confined within the levees reaching such a height as to cause any inconvenience. On the 17th a large boom containing about 2,700 logs belonging to the plant of the Chicago Mill and Lumber Company, located at this point, broke loose and drifted down the river.

Tennessee and Cumberland Rivers. (Reported by L. M. Pindell, Chattanooga, Tenn., and H. C. Bate, Nashville, Tenn.)—From the 12th a splendid boating tide prevailed in the Tennessee, causing at all river stations considerable business along the water fronts. About 2,500,000 feet of lumber arrived at Chattanooga in rafts from the Clinch River during the last two days of the month, consigned to various saw mills and manufacturing companies; more logs would have arrived but the log tides did not extend to the headwaters. Then, again, the mill men complain of several milldams across the Clinch River which obstruct the river and prevent the rafts from passing over. The rainfall of the month was evenly distributed and amounted to more than 8 inches at Kingston and Riverton. A general snowstorm prevailed over the watershed above Chattanooga on the 30th.

The month opened with the Cumberland River open as far up as Celina, but a steady fall shut off navigation above Nashville on the 5th. Heavy and general rains on the 10th and 11th caused a rapid rise, and good rain at intervals during the balance of the month kept the river open to the head of navigation. The river reached its maximum from the 23d to the 25th, and was the highest January river in many years; much damage resulted from the overflow. The river began falling at Burnside on the 23d. The month closed with good water below Celina, but above that point the river was falling rapidly and promised to close navigation in the upper divisions early in February.

Mississippi River and minor branches. (Reported by P. F. Lyons, St. Paul, Minn.; M. J. Wright, Jr., La Crosse, Wis.; G. E. Hunt, Davenport, Iowa; F. Z. Gosewisch, Keokuk, Iowa; H. C. Frankenfield, St. Louis, Mo.; P. H. Smyth, Cairo, Ill.; S. C. Emery, Memphis, Tenn.; R. J. Hyatt, Vicksburg, Miss.; and R. E. Kerkam, New Orleans, La.)—The rivers of Minnesota remained frozen over during all the month, and gauge readings could not be made at St. Paul, but an estimate of the stage of water in the Mississippi River was made from time to time, from which it was concluded that the highest and lowest gauge readings at St. Paul, if they could have been made, would have been 3.6 feet on the 4th, and 2.8 feet on the 22d. The ice in the river at this place attained a thickness at from 16 to 20 inches, which is greater than would be expected considering the mildness of the winter so far, but the almost total absence of snow no doubt accounts for it. Only a limited quantity of ice was harvested from the river, and that only for cold storage and like purposes. Ice harvested from lakes in this vicinity was from 1 to 2 inches thicker than that from the river.

In the vicinity of La Crosse the Mississippi River remained frozen during the entire month. During the early part of the month the ice in some places became weakened by the falling of the water and the high temperature, and on the 2d a Minnesota farmer broke through the ice near the Wisconsin shore while crossing with a load of wood. On the 19th the channel of Black River was open for some distance from its mouth. Good sleighing and mild weather prevailed, and a large variety of country produce was brought into market, many farmers coming from down-river points on the ice road. Considerable activity prevailed in nearly all branches of business as a result of favorable weather. The ice harvest progressed rapidly and satisfactorily during the month, some dealers having completed their harvest; others have their stock stored away for the summer and are now cutting ice for contracts.

The Mississippi at Dubuque has been entirely frozen over during the month of January, the ice ranging in thickness from 13 inches during the first two weeks to 16 inches at the close. The ice harvest at this

place has been on an extensive scale, authorities reporting about 55,000 tons gathered. Between 600 and 700 men were employed in this work.

At Davenport the ice ranged from 10 to 12 inches in thickness throughout the month, and an abundant amount was stored by icemen for summer use. At the lower end of the city the ice was somewhat thicker and the Crescent Bridge Company, which is engaged in the construction of a railroad bridge at that point, transported stone and other material across the ice. The month closed with about 14 inches of snow on the ground, which may cause a moderate rise in the river if it goes off rapidly.

The river was closed at Keokuk, with ice averaging 12 inches, until the 16th. During the afternoon of the 16th the current on the rapids loosened the ice, which moved down, swelling the river to a stage of 9 feet at Keokuk. The movement of ice continued at intervals during the 17th, packing on the Iowa shore and crushing heavy timbers in the northern draw rest and ice breaks of the Keokuk and Hamilton bridge. During the night of the 17th the channel opened south, with heavy shore ice still holding. The shore ice was broken up by wind during the storm of the 22d, filling the channel with heavy floating ice, which formed a gorge south of the station during the 23d, and the river closed again during the night of the 23d, remaining closed at the end of the month, with ice averaging 11 inches in thickness.

The first day of January, 1898, saw the Mississippi practically blocked as far south as the mouth of the Missouri River, but on the 3d, owing to the warm weather, a gradual loosening and thawing commenced. This progressed steadily, and on the 7th ice cutting was suspended at Burlington, the ice being too soft for commercial purposes. The gorges below Burlington broke as follows: At Alton on the 11th, Grafton on the 9th, Louisiana on the 11th, and Quincy on the 18th. The cold of the 16th terminated the thaw, and on the 17th the river was once more practically closed from Canton northward, remaining so at the end of the month. Ice cutting at Burlington was resumed on the 17th and teams were once more crossing on the ice. Below the mouth of the Missouri River the ice continued to run until about the 12th, when it ceased. On the 28th it again commenced to run from Canton to Hannibal, reaching Louisiana on the 30th and St. Louis on the 31st. About the middle of the month the steamer *Eileen* came out of the Illinois River, bringing a cargo of grain to St. Louis. This was the only boat to reach St. Louis from the north. Southward navigation continued uninterruptedly during the entire month. On the Illinois River the ice broke at Beardstown on the 12th and ran out at Grafton the same day.

From Cairo to Helena during the first ten days of the month, there was a steady fall of a little over one-half foot per day, but this was checked at Cairo on the 10th, Memphis on the 11th, and Helena on the 13th, by a sudden rise coming out of the Ohio and Cumberland rivers and due to heavy rains over the entire region drained by these streams. At first the rise was only moderate, but as soon as the numerous small streams began to empty into the main tributaries, it increased rapidly, and for several days the water came up at the rate of 2 or 3 feet every twenty-four hours. During the eleven days ending January 22 the amount added to the Memphis stage was 22.5 feet, while at Cairo and Helena the increase was over 27 feet, which was more than double the rise that occurred during any corresponding period of the 1897 overflow.

At Memphis the entire rise for the month amounted to 27.9 feet, the highest stage being 33.2 feet, which was reached on the 31st. The rainfall was excessive during this period all over the lower Mississippi and Ohio valleys, and in the latter section melting snow aided in swelling the flood. The rainfall at Memphis between the 11th and 23d was over 9 inches, or about $4\frac{1}{3}$ inches more than the normal fall for the whole month of January. On the 26th the river began to go over its banks, and by the 27th it had spread through the woods for a considerable distance on the Arkansas side, and the ferry steamer *Organ* had begun to make trips to Marion, Ark., which is 12 miles inland. At that time there was water enough in the Tennessee Chute to admit of boats passing through, and some small ones did so, instead of following the main river around the island. The river getting over its banks caused a decided decrease in the rise, and by the end of the month the river was nearly stationary.

One noteworthy fact in connection with the present rise is that the flood stage at Memphis approached about three feet nearer to the Cairo reading than ever before. This was probably due to the excessive rains in this vicinity, which caused a rapid swelling of the small streams emptying into the Mississippi between Memphis and Cairo, chief of which are the Forked Deer, Obion, Wolf, and Hatchie. These streams drain a considerable area, and together they furnish a vast amount of water which was measured on the Memphis gauge.

There are but two instances on record of a higher stage in this section during January, and those were in 1882 and 1890. The 1882 rise was the most remarkable in point of duration. It began during the latter part of December and continued for about four months. At Memphis, that year, the river reached a 34-foot stage on January 29, and remained at or above 34 feet during February. In March it reached 35 feet, but fell to 32 feet by the end of that month, though it did not fall to 30 feet until April 10. It was in flood from January 25 to March 30, a period of sixty-five days. The rainfall for the first three months of 1882 amounted to 31.89 inches, or 15.23 inches above the normal for those months. The flood of 1890 also began in January; the river fell slightly during February, and then was in flood again during March and up to April 19. The conditions at the close of January, 1898, are favorable for an early decline of the flood. The low lands along the river are generally covered, but no great damage has so far resulted, and all railway trains are running as usual.

The Mississippi and its tributaries between Memphis and Vicksburg were rather low the first part of the month, but a rise reached this section about the middle of the month and from that time a rapid and decided rise was maintained to the end of the month. Good rains over the country drained by the White and Yazoo produced rises in those streams ample for all river traffic. Steamboats are now running on good time and river business is about all that could be desired. Some interruption was caused to river trade at Vicksburg the first of the month, due to the impassable condition of the road to the lower landing at Kleinston, where boats are compelled to land during low water. The rise in the river the latter part of the month, however, allowed boats to land at the city front, and the wharf boat was moved up to the city landing. Considerable anxiety was caused by the unfinished condition of the levees along the Mississippi, where crevasses occurred last year, in view of the impending rise in the river.

The Mississippi below Vicksburg was at a low but navigable stage during the first half of the month, after which a rapid rise occurred to the close of the month. The January rise was one of the most rapid in recent years, Vicksburg's rise being 30 feet and New Orleans' about 9 feet.

Missouri River. (Reported by L. A. Welsh, Omaha, Nebr.; P. Connor, Kansas City, Mo.; and H. C. Frankenfield, St. Louis, Mo.)—From a point considerably below Atchison, Kans., to the headwaters of the Missouri, the river remained frozen throughout the entire month. An average thickness of ice of about 8 inches was maintained at Omaha, increasing to 10 inches farther up the river. Remarkably mild weather, with but very little precipitation, prevailed throughout the Missouri watershed during the first and second decades, and especially in the upper Missouri valley region. Indicative of the unusually mild conditions, the Huron Press (S. Dak.) reports that on the 22d a party of young people from that city went 3 miles up the James River and enjoyed a picnic, dining in the open air, and playing open-air games as if it had been June instead of January. On the 19th it was reported from Vermilion, S. Dak., that the ice in the upper Missouri and Vermilion rivers did not exceed a thickness of 8 inches, and that with the continuation of mild weather the ice would soon be running; no ice houses had been filled, and building had been carried on all winter with hardly a day too cold for outside work. The cold wave on the night of the 24th and 25th, which extended over the upper valleys, materially changed the conditions, and more seasonable weather prevailed the remainder of the month.

The variations in the stage of the river at Kansas City have been very slight during the month, being between the stages of 4.8 and 5.4 feet. There was more or less floating ice each day except from the 16th to the 22d, when the river was clear.

The tendency of the lower Missouri was toward a somewhat higher stage, and, except at the mouth of the river, ice was not present in any great quantities. To the rather abundant rainfall and to the prevailing high temperatures these conditions may be attributed. Floating ice was noticed east of Kansas City until the 6th, when it ceased. It was again observed at Boonville from the 15th to the 18th and from the 24th to the 31st, but disappeared before reaching Hermann.

The gorge at the mouth of the river broke on the 11th and the ice rapidly disappeared down the Mississippi. The breaking of this gorge allowed the little steamer *Laura* to come out of the river and proceed to St. Louis. This steamer had been blocked by the ice during the cold weather of December at Port Royal, Mo., 60 miles above St. Louis, while endeavoring to make her way south to the Ouachita River to engage in winter trade. During the latter part of the month it was reported that the river at Sibley, Mo., was fast cutting into the north bank just above the Santa Fe Railroad bridge. The railroad company hastily began the work of repairs to prevent farther encroachments, and was evidently successful, for no news of farther cutting has been received. On January 1 readings of the new river gauge at Hermann, Mo., were commenced. The new gauge is located about 95 yards west of the old one, and its zero is set 3 feet lower, being at low water mark of December 21–22, 1878. This zero is 68.2 feet above the St. Louis directrix, and 480.9 feet above mean sea level. The new gauge is a substantial structure, and is well out of the way of the boats which so often proved a source of disaster to the old gauge.

Arkansas River. (Reported by J. J. O'Donnell, Fort Smith, Ark., and F. H. Clarke, Little Rock, Ark.)—The upper Arkansas River remained low and falling until the 13th, when a rise of 0.1 foot was indicated at Fort Smith. The rain of 11th to 15th caused a rise of 3 to 3.5 feet on the 17th in the Canadian, Grand, and Verdigris rivers; this effected a navigable stage in the Arkansas River at Fort Smith the afternoon of 19th, which continued until the end of the month. As the rise was anticipated the river steamers had cargoes shipped ready to take advantage of it westward to Webbers Falls, and the first trip was made since the second week in August.

The Arkansas River west of Little Rock continued too low for navigation during the first fifteen days of the month, but general rains over southern Kansas, Oklahoma and Indian Territories, and Arkansas on the 11th caused a decided rise of over one foot that was felt from Fort Smith to Little Rock on the 15th. The lower river continued rising to the 18th. Frequent rains during the last two weeks of the month caused slight fluctuations in the depth of the river, but a profitable boating stage was maintained uninterrupted from Fort Smith to the mouth during the last sixteen days of the month. The river from Little Rock to the mouth was navigable throughout the month and was free of ice and drift perilous to navigation.

Red River. (Reported by C. Davis, Shreveport, La., and R. E. Kerkam, New Orleans, La.)—A stage of water too low for navigation, except for the lightest craft, continued in the Red until the middle of the month, when the lower river rose to a navigable stage. The development of an exceptionally large number of storms in the Southwest, and their progression northeastward induced heavy rains in the watershed at intervals. The increased stages, consequent upon this increment of moisture, gave new life to the river interests, which, on account of low water, had languished since August, 1897.

There was a navigable stage in the Ouachita after the first week of the month, the river rising rapidly at Camden after the 5th and at Monroe after the 8th; the rise at Camden continued until the 25th, and at Monroe until the closing days of the month, and the total rise ranged from 25 to 28 feet.

Heights of rivers above zeros of gauges, January, 1898.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn. †	1,957	14	.....	.....	.....	.....	.....	.....
Reeds Landing, Minn. †	1,887	12	.....	.....	.....	.....	.....	.....
La Crosse, Wis. †	1,822	10	.....	.....	.....	.....	.....	.....
North McGregor, Iowa †	1,762	18	.....	.....	.....	.....	.....	.....
Dubuque, Iowa †	1,702	15	.....	.....	.....	.....	.....	.....
Leclaire, Iowa †	1,612	10	.....	.....	.....	.....	.....	.....
Davenport, Iowa †	1,596	15	.....	.....	.....	.....	.....	.....
Keokuk, Iowa †	1,466	14	.....	.....	.....	.....	.....	.....
Hannibal, Mo	1,405	17	2.9	2	0.9	31	2.0	2.0
Grafton, Ill	1,307	23	5.9	27	3.9	3	4.7	2.0
St. Louis, Mo.	1,264	30	7.7	28	1.6	4	5.0	6.1
Chester, Ill.	1,189	30	5.8	24	0.4	1	3.5	5.4
Cairo, Ill	1,073	40	44.4	31	9.5	8,9	26.7	14.9
Memphis, Tenn	843	33	33.2	31	5.3	11	19.0	27.9
Helena, Ark	767	44	41.8	31	8.0	11,12	23.0	33.8
Arkansas City, Ark.	635	42	40.5	31	9.2	13	22.3	31.3
Greenville, Miss	595	40	34.7	31	7.2	13	18.2	27.5
Vicksburg, Miss	474	41	39.2	31	7.9	1	19.3	31.3
New Orleans, La	108	16	12.6	31	2.8	3	6.1	9.8
Arkansas River.								
Wichita, Kans.	720	10	1.7	18,18	0.6	5–11	1.1	1.1
Fort Smith, Ark.	345	22	7.7	21	1 0	11,12	3.3	6.7
Dardanelle, Ark.	250	21	7.2	23	0.2	12	2.8	7.0
Little Rock, Ark.	170	23	10.1	24	2.9	5	6.2	7.2
White River.								
Newport, Ark	150	26	14.2	24,25	2.1	10	7.5	12.1
Des Moines River.								
Des Moines, Iowa †	150	19	.....	.....	.....	.....	.....	.....
Illinois River.								
Peoria, Ill.	135	14	7.7	31	4.0	8,10,11	5.4	3.7
Missouri River.								
Bismarck, N. Dak. †	1,201	14	.....	.....	.....	.....	.....	.....
Pierre, S. Dak. †	1,006	14	.....	.....	.....	.....	.....	.....
Sioux City, Iowa †	676	19	.....	.....	.....	.....	.....	.....
Omaha, Nebr. †	561	18	.....	.....	.....	.....	.....	.....
St. Joseph, Mo.	373	10	.....	.....	.....	.....	.....	.....
Kansas City, Mo.	280	21	5.4	5–7,26,27	4.8	18	5.1	0.6
Boonville, Mo.	191	20	5.6	27	3.2	2	4.2	2.4
Hermann, Mo.	95	21	5.8	27	2.2	4,7	3.9	3.6
Ohio River.								
Pittsburg, Pa.	966	22	19.7	24	3.4	5,6	10.8	16.3
Davis Island Dam, Pa.	960	25	18.0	24	5.4	5	11.2	12.6
Wheeling, W. Va.	875	36	27.5	25	6.3	2	16.4	21.2
Parkersburg, W. Va. [a]	785	35	31.0	26	8.0	6	20.3	23.0
Point Pleasant, W. Va.	703	36	37.0	26,27	7.5	4	24.1	29.5
Catlettsburg, Ky	651	50	43.5	27	10.1	5	28.6	33.4
Portsmouth, Ohio	612	50	46.8	27	10.9	1	30.9	35.9
Cincinnati, Ohio	499	45	52.2	26	13.8	1,2	35.3	38.4
Louisville, Ky.	367	24	29.8	26,27	6.8	3	17.4	23.0
Evansville, Ind	184	30	43.1	28	10.0	5	28.1	33.1
Paducah, Ky.	47	40	43.8	30,31	7.6	8	25.5	36.2
Alleghany River.								
Warren, Pa.	177	7	8.3	14	1.4	1,9,10	4.0	6.9
Oil City, Pa.	123	13	10.0	14	2.0	11,12	4.6	8.0
Parkers Landing, Pa. [b]	73	20	11.0	14	1.7	1	6.6	9.3
Freeport, Pa.	26	20	18.0	14	3.5	3,4	10,0	14.5
Conemaugh River.								
Johnstown, Pa.	64	7	6.8	26	1.4	4–6	3.5	5.4
Red Bank Creek.								
Brookville, Pa.	85	8	5.3	13	0.8	3–12	1.7	4.5
Beaver River.								
Ellwood Junction, Pa.	10	14	5.1	23	1.0	4–6,19	2.4	4.1
Cumberland River.								
Burnside, Ky	434	50	32.6	23	2.1	4	12.8	30.5
Carthage, Tenn.	257	30	34.1	25	2.6	5,6	18.2	31.5
Nashville, Tenn	175	40	38.8	23	4.0	6,7	23.1	34.8
Great Kanawha River.								
Charleston, W. Va.	61	30	13.1	11	3.8	5	7.1	9.3
New River.								
Hinton, W. Va.	95	14	5.0	16	1.1	3,4	2.8	3.9

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Licking River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Falmouth, Ky.	30	25	27.5	23	3.0	3–5,31	9.8	24.5
Miami River.								
Dayton, Ohio	69	18	9.4	21,23	1.4	6	4.2	8.0
Monongahela River.								
Weston, W. Va.	161	18	10.9	10	0.0	19,22	2.7	10.9
Fairmont, W. Va.	119	25	14.1	11	2.7	30	5.9	11.4
Greensboro, Pa.	81	18	17.4	11	8.2	6	11.4	9.2
Lock No. 4, Pa.	40	28	23.9	11	8.6	5	13.7	15.3
Cheat River.								
Rowlesburg, W. Va.	36	14	8.5	10	3.0	1–7	4.6	5.5
Youghiogheny River.								
Confluence, Pa.	59	10	7.0	13	1.9	6	4.0	5.1
West Newton, Pa. [c]	15	23	8.0	16,24	1.3	3	4.7	6.7
Muskingum River.								
Zanesville, Ohio	70	20	22.4	24	6.5	4	13.8	15.9
Tennessee River.								
Knoxville, Tenn.	614	29	8.9	27	0.7	6	4.0	8.2
Kingston, Tenn	534	25	10.1	27	0.6	6	5.2	9.5
Chattanooga, Tenn.	430	33	18.2	27	2.6	6	9.1	15.6
Bridgeport, Ala	390	24	14.8	28	1.3	6–8	7.2	13.5
Florence, Ala.	220	16	13.8	20, 28, 29	1.4	10	7.8	12.4
Johnsonville, Tenn.	94	21	29.1	24	3.1	10,11	15.5	26.0
Clinch River.								
Speers Ferry, Va.	156	20	5.2	26	0.2	3,4	1.7	5.0
Clinton, Tenn	46	25	14.5	27	3.4	6	8.9	11.1
Wabash River.								
Mount Carmel, Ill	50	15	21.8	31	2.6	3	12.9	19.2
Red River.								
Arthur City, Tex.	688	27	.....	.....	.....	.....	.....	.....
Fulton, Ark	565	28	13.8	24	2.5	11	6.6	11.3
Shreveport, La.	449	29	12.0	27–29	1.2	8–13	5.6	10.8
Alexandria, La	139	33	19.0	25	1.8	12	8.2	17.2
Atchafalaya Bayou.								
Melville, La	100*	31	30.3	31	14.3	1,14	19.9	16.0
Ouachita River.								
Camden, Ark.	340	39	33.7	25	6.0	5	22.4	27.7
Monroe, La	100	40	33.8	31	9.1	8	13.8	24.7
Yazoo River.								
Yazoo City, Miss.	80	25	21.7	31	5.2	14	13.0	16.5
Chattahoochee River.								
Columbus, Ga.	140	20	6.3	29	0.7	12,13	1.9	5.6
Flint River.								
Albany, Ga.	80	20	2.3	21–23, 27, 28	1.6	5–8,17	2.0	0.7
Cape Fear River.								
Fayetteville, N. C.	100	38	14.0	27	3.3	12	4.8	10.7
Columbia River.								
Umatilla, Oreg	270	25	5.5	2	2.7	30	4.1	2.8
The Dalles, Oreg.	166	40	9.0	1	2.7	31	5.5	6.3
Willamette River.								
Albany, Oreg	99	20	8.8	21	4.0	13,14	5.7	4.8
Portland, Oreg	10	15	8.5	1	2.6	31	5.6	5.9
Edisto River.								
Edisto, S. C	75	6	3.8	1	2.9	20–24	3.2	0.9
James River.								
Lynchburg, Va.	257	18	2.8	17	0.2	3	1.4	2.6
Richmond, Va.	110	12	1.9	20	— 0.1	4–12	0.6	2.0
Alabama River.								
Montgomery, Ala.	265	35	13.8	29,30	0.9	10,11	4.4	12.9
Selma, Ala.	212	35	15.4	31	0.8	9,12	4.9	14.6
Coosa River.								
Rome, Ga.	225	30	14.6	27	1.3	7–10	4.4	13.3
Gadsden, Ala [d]	144	18	15.4	28	0.7	7–10	4.6	14.7
Tombigbee River.								
Columbus, Miss.	285	33	21.5	25	— 0.5	10	13.9	22.0
Demopolis, Ala. [e]	155	35	45.4	31	4.8	11	26.1	40.6
Black Warrior River.								
Tuscaloosa, Ala.	90	38	43.5	27	4.0	10,11	17.2	39.5
Pedee River.								
Cheraw, S. C.	145	27	12.0	27	1.0	11	2.7	11.0
Black River.								
Kingstree, S. C.	60	12	5.6	3	3.2	21–23	4.2	2.4
Lumber River.								
Fairbluff, N. C.	10	6	2.1	31	0.6	19–22	1.3	1.5
Lynch Creek.								
Effingham, S. C.	35	12	5.8	2	3.4	20,21	4.1	2.4
Potomac River.								
Harpers Ferry, W. Va.	170	16	7.5	24	1.3	10	3.6	6.2
Roanoke River.								
Clarksville, Va.	155	12	0.3	26	0.1	1–24,30,31	0.1	0.2
Sacramento River.								
Redbluff, Cal.	241	23	1.2	15	0.4	30,31	0.8	0.8
Sacramento, Cal.	70	25	10.7	8,9	9.2	31	10.0	1.5
Santee River.								
St. Stephens, S. C.	50	12	7.1	31	1.1	21,22	2.9	6.0
Congaree River.								
Columbia, S. C.	37	15	4.8	26	1.2	3–5	1.7	3.6
Wateree River.								
Camden, S. C.	45	24	13.5	27	2.7	14	4.9	10.8
Savannah River.								
Augusta, Ga.	130	32	16.7	27	5.9	5,9	7.5	10.8
Susquehanna River.								
Wilkesbarre, Pa.	178	14	17.9	16	2.0	2–13	5.2	15.9
Harrisburg, Pa.	70	17	10.5	25	1.9	5,6	5.2	8.6
Juniata River.								
Huntingdon, Pa.	80	24	7.0	23	3.6	6,7	4.7	3.4
W. Br. of Susquehanna.								
Williamsport, Pa.	35	20	9.9	24	1.7	3,4	4.9	8.2
Waccamaw River.								
Conway, S. C.	40	7	2.1	1,31	0.8	12,13	1.4	1.8

* Distance to Gulf of Mexico. † Frozen entire month. [a] Frozen, 5. [b] Frozen, 3–12. [c] Frozen, 4–6. [d] Record for 27 days. [e] Record for 23 days.